



The West Valley Demonstration Project

EXECUTIVE SUMMARY

Project Description

The West Valley Demonstration Project (WVDP), the site of a U.S. Department of Energy environmental cleanup activity operated by West Valley Nuclear Services Co., Inc. (WVNS), is in the process of solidifying liquid high-level radioactive waste remaining at the site after commercial nuclear fuel reprocessing was discontinued. The Project is located in Western New York State, about 30 miles south of Buffalo, within the New York State-owned Western New York Nuclear Service Center (WNYNSC). The WVDP's central mission is to solidify the liquid high-level waste, now stored in underground tanks, in containers suitable for temporary storage on-site and for eventual transport to a federal repository. A major achievement in 1996 was the initiation of vitrification, a process in which the high-level waste is solidified in a durable, solid glass form.

Compliance

Management at the WVDP continued to provide strong support for environmental compliance issues in 1996. DOE Orders and applicable state and federal statutes and regulations are integrated into the Project's compliance program.

- Inspections by the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) of hazardous waste activities verified Project compliance with the regulations.

- The Project continued to identify and evaluate specific waste management areas at the site to comply with the Resource Conservation and Recovery Act (RCRA) 3008(h) Administrative Order on Consent.

- The Project also met the requirements of the Emergency Planning and Community Right to Know Act (EPCRA) by identifying and making available to the local community information about hazardous materials used at the Project. All EPCRA reporting deadlines were met in 1996.

- The State Pollutant Discharge Elimination System (SPDES) permit currently identifies four per-

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mitted liquid outfalls at the Project. Permit applications to identify up to thirty-two storm water outfalls and to increase flow due to groundwater treatment activities were submitted in 1996.

- Although SPDES permit limits were exceeded twice in 1996 during temporary process upsets, this was an improvement over the seven exceedances recorded in 1995.
- No notices of violation from any environmental regulatory agencies were received in 1996.
- Among other pollution prevention accomplishments, waste minimization goals for 1996 were exceeded in all of the waste categories set in the goals statement.
- Although two unplanned on-site radiological liquid releases (minor spills inside previously contaminated facility areas) occurred during the year, there were no accidental off-site releases of radiological material in 1996.

Environmental Monitoring Program

Throughout the preparations and especially during the actual start-up of the vitrification process, specific, additional attention was given to environmental monitoring and assessment of effluents from site facilities. During 1996 Project environmental scientists continued to sample and measure effluent air and water, groundwater, surface streams, soil, sediment, vegetation, meat, milk, and game animals, and to record environmental radiation measurements. More than 11,000 samples were collected in order to assess the effect of site activities on public health, safety, and the environment.

The Project environmental monitoring network is continually being evaluated and updated to ensure that all locations and sample types that would be sensitive to process-related changes are monitored.

Once samples are collected, they are tested for radioactivity or nonradioactive substances using approved laboratory procedures. Both the laboratory test results and direct measurement data are reviewed at several stages for quality and for comparison with similar data. Environmental monitoring results are kept up-to-date in a controlled computer database available to WVDP scientists, who assess the data and evaluate trends at key locations.

Air Monitoring

WVDP airborne radiological emissions include six routinely operated permitted exhaust stacks and five exhausts excluded from permitting because of their low emission potential. As anticipated, radioactive releases from the Project in 1996 were far below the most restrictive limits that ensure public health and safety. Start-up of the vitrification process in June added to the ventilation exhaust and slightly increased the total radiological air releases. The dose from 1996 air emissions was about 0.09% of the most restrictive limit. In 1995 the dose from these emissions was about 0.004%.

Although several fission products contribute to the radioactivity, the most significant increase was in airborne iodine-129, a long-lived isotope that exists in gaseous form at the high temperatures of the vitrification process. However, the amount of gaseous iodine-129 released during vitrification was far below regulatory limits. The main stack iodine-129 release from the vitrification process accounted for more than 99% of the 1996 calculated airborne dose from WVDP air emissions.

Six air samplers on the perimeter of the WNYNSC and four in more distant locations continuously collect samples of air at the average human breathing height. The samples are tested for radioactivity carried by airborne particles. At two of the ten locations test samples are collected for analysis of tritium and iodine-129. Gross radioactivity in air samples from around the perimeter was not differ-

ent than radioactivity measured in remote background locations or nearby communities. A ten-year trend of gross (airborne particulate) radioactivity at the nearest perimeter sampler did not show any increases in 1996. Concentrations in samples from two on-site ambient air samplers located near waste storage facilities operated during 1996 also were indistinguishable from background levels.

Nonradiological air emission monitoring of nitrogen oxides, a byproduct of the vitrification process, is conducted as part of the emission-control process. Although there are a number of other permitted air emissions sources at the Project, none release a sufficient quantity of nonradiological material to warrant monitoring as a condition of a regulatory permit.

Surface Water Monitoring

The largest single source of radioactivity released to surface waters from the Project is the discharge from the low-level waste treatment facility through the lagoon 3 release outfall. The treated effluent water flows into Erdman Brook, which joins Frank's Creek just before exiting the Project's fenced area. Seven treated batches totaling 13.4 million gallons were released over a combined fifty-five day period in 1996. In 1995, 10.3 million gallons had been released. A large portion of the increase was due to treatment of groundwater pumped from the area north of the main facility.

The combined average concentrations of all radioactive isotopes in these releases in 1996 totaled approximately 35% of the DOE derived concentration guide (DCG) used to evaluate liquid process discharges. This is a decrease from the 43% average concentration in 1995.

Surface water is continually sampled on the Project premises by four automatic samplers. Time-composite samples are collected at Frank's Creek

where it exits the Project and at two other on-site points where drainage flows off-site. Another automatic sampler is located at a drainage point near the former radioactive waste disposal areas. Samples also are collected periodically at nine other points of drainage from facility areas. The data from these samples are used to determine the type, amount, and probable origin of both radiological and nonradiological contaminants.

Again in 1996, the most notable source of gross beta and strontium-90 radioactivity in surface water was from groundwater flowing beneath the north plateau and emerging to join the surface water drainage from the north plateau into Frank's Creek and thence off-site. In 1996 the strontium-90 concentration, which originates from pre-Project operations, was about 1.3 times the derived concentration guide (DCG) for liquid discharges. This drainage point has been carefully monitored since the contaminated seep was identified in 1993. Currently, water contaminated with strontium-90 in the north plateau drainage area is being collected and treated by a groundwater recovery system.

Soil and Stream Sediments

Surface soil is collected annually at the ten air sampler locations to track long-term deposition. Sediments from off-site creeks are collected from three downstream and two upstream locations. Three on-site drainage areas are also sampled to track waterborne movement of contaminants.

Surface soil samples in 1996 showed little change from previous years. For the most part, except for one area that historically shows average cesium-137 concentrations above background values, the concentrations of radionuclides normally present both in worldwide fallout and in Project air emissions are no different at near-site locations than at background locations. The above-background detection of strontium-90 in two near-site soil samples in 1996 was not accompa-

nied by air effluent releases on-site of sufficient magnitude to explain them and may be the result of analytical uncertainties. Due to pre-Project releases from nuclear fuel reprocessing activities, the concentrations of radioactivity in downstream creek sediments historically are above concentrations in the upstream sediments. However, the eleven-year graphs show no upward trends at either upstream or downstream points. No changes were noted in on-site soil/sediment samples between 1996 and previous years.

Groundwater Monitoring

Scheduled groundwater samples were collected from sixty-five on-site locations in 1996. Based on an evaluation of results from the 1995 program, the location, frequency of sampling, types of testing, and method of sample collection were adjusted for the 1996 monitoring program. Computerized screening of 1996 data speeded identification and evaluation of changes. Monitoring activities in 1996 included gathering more detailed information about the north plateau strontium-90 contamination. The 1996 groundwater program confirmed that strontium-90 is still the major contributor to elevated gross beta contamination in the plume on the north plateau. The concentrations of other isotopes were below the DCG levels generally applied to surface water. In addition to sampling wells, groundwater was collected from seeps on the side of the bank above Frank's Creek.

As in previous years, near-site residential water supply wells sampled during 1996 indicated no radioactive contamination.

Vegetation, Meat, and Milk

Test results from beans and sweet corn showed no difference between annual samples collected near the site and samples taken from remote locations. A single hay sample showed a strontium-90 result three times higher than its control location, but

this increase was not corroborated by other sample types collected nearby. Apples collected from an on-site tree (not used for human consumption) had strontium-90 at levels about three times the background values, but not much higher than observed in 1995. In 1996, as in previous years, very little difference in radioactivity concentration was observed between samples of beef and milk from near-site and remote locations.

Game Animals

Fifty fish specimens from Cattaraugus Creek were collected in 1996 for testing. Ten of these were from below the Springville dam, including species that migrate up from Lake Erie. Two semiannual sample sets of ten fish each were collected downstream of Buttermilk Creek, which receives Project liquid effluents, and two sets were collected upstream. These samples represent sportfishing species and bottom-feeding indicator species. Testing for gamma-emitting isotopes and strontium-90 showed levels very similar to those in 1995 samples. Concentrations in downstream and upstream specimens of the same species were similar.

Three samples of whitetail deer venison from an on-site (WNYNSC) herd were tested for gamma-emitting isotopes and strontium-90. Two of three on-site venison samples were at background strontium-90 values. One sample, however, contained strontium-90 concentrations that were four times above the average 1993 to 1996 background concentration. One person eating 100 pounds of meat from this deer would receive 0.03 millirem, which is 3,300 times less than the DOE 100 mrem dose standard applicable to a member of the public. In comparison to an equal number of samples from deer taken in areas remote from the Project, the values for gamma-emitting isotopes were similar.

In 1996, the third year of public access to portions of the WNYNSC for deer hunting, 149 deer were taken by hunters during the hunting season.

Program Quality

The WVDP environmental program is designed to produce high quality, reliable results. To maintain this standard, each scientist must give continuous attention to the details of sample handling, following approved collection and analysis procedures and data review. In addition to a formal self-assessment review just before vitrification start-up, the WVDP environmental laboratory also continued the practice of analyzing radiological crosscheck samples sent from a national laboratory. Of 139 radiological analyses performed at both the on-site Project laboratory and off-site commercial service laboratories, 93% were within the control limits. Of the forty-six samples tested on-site at the Project environmental laboratory, 100% were within acceptable values, and 100% of the twenty-three nonradiological check samples tested at an off-site laboratory were within acceptable values.

Although no formal external audits of the environmental program were conducted in 1996, test results from the crosscheck program and from co-located sample measurements taken by independent agencies such as the Nuclear Regulatory Commission (NRC) and the New York State Department of Health (NYSDOH) indicate that high quality standards are being met. The WVNS Environmental Affairs and the WVNS Quality Assurance departments periodically conducted and documented informal reviews of program activities in 1996.

Notable 1996 Events

The central event during 1996 was start-up of the WVDP vitrification facility. Preoperational testing and readiness reviews occupied the first part of the year. After June the focus shifted to keeping close watch on the new process.

Changes in air emissions were noted. The release rate of radon-220 increased, as did the release rate of radioactive iodine isotopes. Although the actual levels are small compared to public health standards, identifying these changes was important in assessing the environmental characteristics of the new vitrification process.

Dose Assessment

There were no events affecting public health and safety or the environment associated with Project operations in 1996. The small amounts of radioactive materials that were released were assessed and doses were calculated using approved computer modeling codes. These evaluations include calculations of doses received from the consumption of game animals and locally grown food. Airborne doses were calculated using CAP88-PC, an EPA-approved computer code. The result was a maximum dose to an off-site individual of 0.009 millirem (mrem). The limit is 10 mrem. Doses from the liquid pathway to the maximally exposed person were estimated to be 0.04 mrem from Project effluents. The north plateau drainage contribution to the total liquid dose was estimated to be 0.02 mrem. The predicted dose from all pathways was less than 0.08 mrem, or 0.08% of the 100 mrem DOE limit.

Conclusion

The West Valley Demonstration Project conducts extensive monitoring of on-site facilities and the surrounding environment. This program fulfills federal and state requirements to assess the impact of Project activities on public health and safety and the environment. In addition to demonstrating compliance with environmental regulations and directives, evaluation of data collected in 1996 indicates that Project activities pose no threat to public health, safety, or the environment.

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